

### About PGS

Petroleum Geo-Services is a focused geophysical company providing a broad range of seismic and reservoir services, including acquisition, processing, interpretation, and field evaluation. The company also possesses the world's most extensive multi-client data library. PGS operates on a worldwide basis with head quarters at Lysaker, Norway. For more information on Petroleum Geo-Services visit [www.pgs.com](http://www.pgs.com).

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With you when it matters

# To capture the world's most reliable seismic data, PGS goes to any lengths

Their industry-leading commitment to safety and innovation drives them to continually explore new methods and materials

**Petroleum Geo-Services (PGS) was founded in Norway, in 1991. Today, the company's fleet of nearly 20 state-of-the-art vessels can be found in the roughest seas providing a broad range of products and services to the offshore oil and gas industry, to help them find and exploit new reserves around the world.**

Much of PGS's core business is in providing "reflection seismology," services to offshore companies, using specially

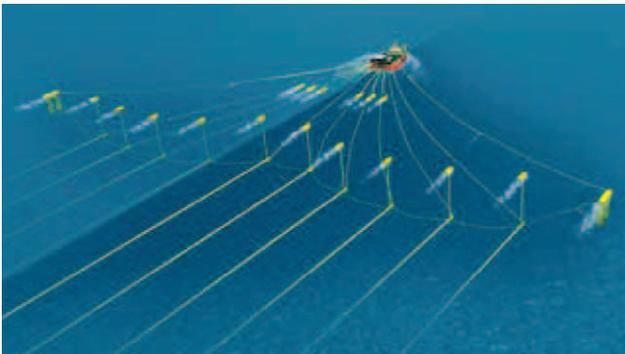
equipped vessels fitted with a series of tethered hydrophone arrays that can reach lengths of up to 12 kilometers.



### In pursuit of a Clearer Image

One of PGS's competitive advantages in the market, is its ability to achieve higher-resolution data, by towing a denser array of sensors. To help reduce the weight of these arrays, PGS has specified lines made with Dyneema®, "the world's strongest fiber"—not only in the superwide tow ropes, but for use throughout all the vessels in their fleet.

This weight reduction became even more important recently when PGS launched the world's largest seismic vessels, the *Ramform Sovereign* and *Ramform Sterling*. These vessels can deploy up to 20 seismic streamers. The towing and spreader ropes are made with Dyneema®.



#### Brad Bertsch, Mechanical Supervisor, PGS:

*"Industry reports show that towing lines made with Dyneema® require replacement only every two years. Steel wire ropes used in seismic applications typically have a lifetime of 4-5 months".*

"Ropes made with Dyneema® proved to be very strong, light weight, and resistant to harsh environments," said Brad Bertsch, PGS's Mechanical Supervisor. "They can be easily spliced, have very little creep, have very low elasticity and are resistant to chemicals and corrosion. And ropes made with Dyneema® are easy on our ships' equipment, sheaves, and winches."

Bertsch also pointed out that Dyneema®'s ability to float was another major advantage over steel cable in seaborne applications.

The weight reduction and low diameter played an important part in the company being able to fit greater lengths of rope onto existing winches, for example, and controlling costs



(such as fuel usage) that are impacted by increased towing weight.

Other Dyneema® benefits cited by the PGS team included:

- Easier handling compared to steel
- Drag reduction in the water through lower diameter/ equal strength
- More accurate positioning of the sensors due to low elongation
- Elimination of the "catenary" effect (because Dyneema® floats)
- Extended lifespan, due to tension and bending fatigue resistance

"Today, all PGS vessels are using ropes made with Dyneema® in some form or another," said Bertsch. "And we are constantly looking for newer ways to use ropes instead of steel cables and chains. We use Dyneema® in our superwide towing rope, streamer spread ropes, various bridling systems and fabricated multiple splice connections."

#### In a "people" business, the crew's safety comes first

PGS has always maintained a strong commitment to health and safety, along with careful attention to the environmental impact of its activities. Part of the company's HSE (Health, Safety and Environment) culture is a goal of "zero injury to people and no damage to the environment."

PGS vessels require crews from 40 to 60 sailors and engineers. For crews working with extremely long lengths of line under enormous tension, one traditional area for concern was the "snap back" hazard of a broken steel wire.

Dyneema® helps to virtually eliminate this threat due its low elongation qualities, a factor that also aids in the precision placement of lines and equipment.

**Brad Bertsch, Mechanical Supervisor, PGS:** *“The use of Dyneema® rope products within the seismic industry and by PGS is still growing,” said Bertsch, “and the improved features of the Dyneema® fiber will enable the use of these products also for new applications.”*



**Brad Bertsch, Mechanical Supervisor, PGS:** *“PGS is committed to continual technical improvement and lightweight DSM Dyneema falls clearly into that category. We started adopting this technology on our wide tow configurations in 1994. Decreasing the weight of the in-sea towing equipment without compromising break strength meant we suffered less drag, which we used to achieve larger separations. In addition the greater safety of these ropes in operation and their extended lifetime compared to steel wire made Dyneema® fiber an obvious choice for rigging our fleet.”*

As the Chief Mechanic aboard the M/V Beaufort Explorer, Leif Ståle Søvik, pointed out: “Rope with Dyneema® treats our gear a lot better than wires, while still maintaining the strength required. It’s a lot easier to handle and the twists that may occur are not as significant as those you get with chains or wires.”

#### **Preparing together for a better future**

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Dyneema® require replacement only every two years. Steel wire ropes used in seismic applications typically have a lifetime of 4-5 months.

“The use of Dyneema® rope products in the Seismic industry with PGS is still growing,” said Bertsch, “and there are always new ideas coming out where Dyneema® can be used one way or another.”